



Nutrition provider confidence in the Massachusetts Childhood Obesity Research Demonstration (MA-CORD) study

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ABSTRACT

Objective: The multi-sector, multi-level Massachusetts Childhood Obesity Research Demonstration (MA-CORD) study resulted in improvements in obesity risk factors among children age 2–4 years enrolled in the Special Supplemental Nutrition program for Women, Infants, and Children (WIC). The goal of this study was to examine whether the MA-CORD intervention increased WIC provider confidence in their ability to identify childhood obesity and obesity-related behaviors.

Methods: As part of the MA-CORD intervention conducted from 2012 to 2015, we implemented WIC practice changes focused on childhood obesity prevention within two Massachusetts communities. We examined changes in provider confidence to assess childhood obesity risk factors and practice frequency among WIC practices located in MA-CORD intervention communities over a 3-year period, compared to non-intervention sites. We measured provider confidence on a continuous scale using questions previously developed to assess provider and parent confidence to make weight-related behavior change (range 0 to 24).

Results: There were 205 providers at baseline and 165 at follow-up. WIC providers at intervention sites reported greater confidence in their ability to identify childhood obesity and obesity-related behaviors compared to the usual care sites ($\beta = 1.01$, standard error = 0.13). These findings persisted after adjusting for provider gender, years in practice, highest education level, and WIC position.

Conclusions: The MA-CORD intervention was associated with increased WIC provider confidence to assess children's obesity risk. Interventions that increase confidence in assessing obesity-related behaviors may have salutary effects within WIC programs that serve low-income families.

1. Introduction

In the United States, one in five children age 2–5 years has overweight or obesity (Skinner et al., 2018). Newly emerging nationally-representative data show recent increases in obesity prevalence in this age group (Hales et al., 2018), as well as persistent socioeconomic and racial/ethnic disparities in obesity that appear to be widening (Ogden et al., 2012). Scalable strategies to prevent obesity in young children who are disproportionately burdened by obesity are thus urgently needed.

Cross-sector collaborations that integrate public health and clinical obesity prevention efforts have been proposed as a potentially effective,

population-level strategy to reduce obesity among vulnerable children (Kumanyika et al., 2010; Nader et al., 2012). The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a unique platform for early childhood obesity prevention in high-risk groups including racial/ethnic minority and low-income populations (Sekhobo et al., 2012), but few community-wide obesity prevention strategies have integrated WIC. The Massachusetts Childhood Obesity Research Demonstration project (MA-CORD) is a multi-sector initiative to prevent childhood obesity among low-income children. In previous analyses, we showed that interventions delivered through MA-CORD were associated with reduced prevalence of obesity risk factors among children age 2–4 years enrolled in WIC (Woo Baidal et al., 2017).

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Table 1

Characteristics of survey respondents, data from 370 WIC providers practicing in Massachusetts communities, 2012–2015.

	Overall (N = 370)	MA-CORD sites (N = 32)	Usual care sites (N = 338)	p-Value
WIC provider respondent characteristics				
Gender, female; n = 344	336 (97.7)	32 (100.0)	304 (97.4)	0.36
Position, nutritionist	355 (96.0)	32 (100.0)	324 (100.0)	–
Total years in practice, 5 or more; n = 368	251 (68.2)	25 (78.1)	226 (67.2)	0.58
Highest education, college degree or more	307 (83.0)	21 (65.6)	286 (84.6)	0.01
Pediatric weight management certificate; n = 361	87 (24.1)	5 (16.1)	82 (24.8)	0.63

Understanding processes through which this intervention affected change will inform implementation of future population-wide efforts to curb obesity in children.

According to social-cognitive theory, individuals who have strong beliefs in their capabilities exert more effort to accomplish an endeavor (Bandura, 1989). In other words, increasing provider confidence may lead to counseling that is more effective. In fact, in pediatric clinical settings, higher levels of provider confidence are associated with a greater extent of counseling on growth and nutrition (Cheng et al., 1999). Here, we examine changes in WIC provider confidence and frequency of practices related to childhood obesity prevention for those practicing in sites participating in the multi-sector MA-CORD intervention versus those in other Massachusetts sites.

2. Materials and methods

2.1. Study overview

MA-CORD was a systems-level, quasi-experimental trial funded by the Centers for Disease Control and Prevention aimed to reduce childhood obesity among underserved children (Dooyema et al., 2013). Descriptions of MA-CORD's design are provided elsewhere (Dooyema et al., 2013). Briefly, MA-CORD included evidence-informed interventions across several sectors, including schools, community health centers and WIC, that were implemented in two Massachusetts communities selected to participate as intervention sites based on size, per capita income, and prevalence of childhood overweight and obesity. In each of these sectors in both of the MA-CORD communities, we implemented evidence-based programs to promote childhood obesity prevention. The intervention start date in WIC was September 1, 2012. All MA-CORD protocols were approved by the Massachusetts Department of Public Health IRB. The protocol for the current study was deemed non-human subjects research by the Indiana University School of Medicine IRB.

2.2. Participants and procedures

Participants were 370 WIC nutritionists and nutrition assistants (hereafter “WIC providers”) practicing within two low-income communities participating in MA-CORD (N = 32) and elsewhere throughout Massachusetts (N = 338). As part of ongoing program evaluation, all WIC providers in the state of Massachusetts were invited to complete an anonymous, self-administered electronic survey in September 2012 (baseline; 68% overall response rate) and in 2015 (post-intervention; 62% overall response rate). Among the subset of Massachusetts WIC providers at MA-CORD intervention sites (hereafter “MA-CORD WIC providers”), all MA-CORD WIC providers completed the baseline survey (N = 20) and 71% of MA-CORD WIC providers completed the follow-up survey.

The survey assessed WIC providers' confidence in and frequency of practices related to childhood energy balance and weight gain. Emailed invitations were sent over a three-week period. WIC providers were eligible if they provided nutrition education in any language.

2.3. WIC intervention

The MA-CORD WIC intervention, described in detail elsewhere (Taveras et al., 2015), consisted of evidence-informed practice changes focused on improving five health behaviors (e.g., eliminating sugar-sweetened beverage intake and limiting 100% juice intake; replacing non-nutritious foods with fruits and vegetables; limiting screen time; increasing physical activity; and increasing sleep duration to 11 h per day for children between ages 2 and 4 years). WIC providers in all sites (intervention and non-intervention) provided usual care, consisting of nutrition assessment and counseling during in-person visits occurring approximately four times per year. Within MA-CORD sites, WIC providers additionally received: (1) full-day trainings on best practices and consistent delivery of MA-CORD target behavior counseling and health messaging; (2) resource and training materials; (3) information about how to incorporate MA-CORD patient and family education materials into WIC counseling; and (4) links to local MA-CORD obesity prevention initiatives and enhanced healthy weight clinic referrals. MA-CORD WIC providers also participated in a multi-sector learning collaborative and train-the-trainer programs. Results of the parent study have been published elsewhere (Woo Baidal et al., 2017).

2.4. Measures

Our main outcome of interest was provider confidence to diagnose childhood overweight/obesity and to identify obesity risk factors (eating behaviors, screen time, physical activity, and sleep). We derived a continuous provider confidence score from 6 questions previously developed to assess provider and parent confidence to make weight-related behavior change (Taveras et al., 2009). Response options were assessed on a Likert-scale (0–4) ranging from “not confident” to “extremely confident.” We summed responses to each item, creating a single variable with higher values indicating a higher level of provider confidence (range 0 to 24; Cronbach's alpha = 0.84).

We also asked providers to report the frequency with which they counseled on child sugar-sweetened beverage intake, fruit and vegetable consumption, physical activity, screen time, and sleep. We also assessed the frequency of communication with primary care providers for children with obesity. Response options were assessed on a Likert-scale (0–4) ranging from “never” to “always.”

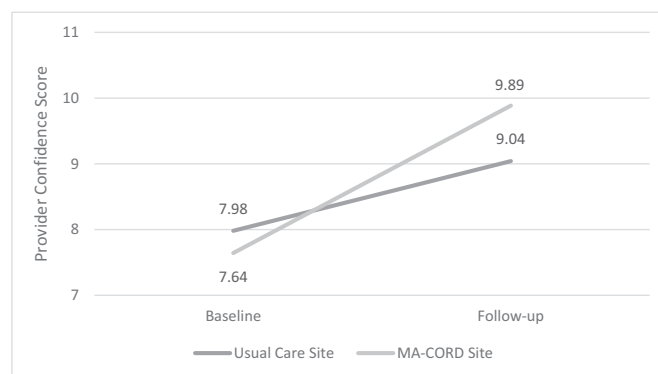
Finally, we queried provider gender, years in practice, highest education level, and WIC position.

2.5. Statistical analyses

We described the sample at baseline with respect to provider confidence and practice behaviors and then assessed differences by intervention site using chi-square and *t*-tests. We used mixed linear regression to assess the intervention's effect on changing provider confidence, expressed as a continuous score ranging from 0 to 24, between MA-CORD intervention and usual care sites. Mixed models accounted for clustering of observations within community and controlled for the aforementioned frequency of counseling factors, as well as for provider years in practice and highest education level. We included a time \times intervention interaction to estimate a separate intervention effect.

Table 2
WIC provider confidence and practices at baseline and follow-up overall, and by MA-CORD intervention site or usual care. Data from 370 WIC providers in Massachusetts, 2012–2015.

	Overall (N = 370)		MA-CORD sites (N = 32)		Usual care sites (N = 338)	
	Baseline (N = 205)	Follow up (N = 165)	Baseline (N = 20)	Follow up (N = 12)	Baseline (N = 185)	Follow up (N = 153)
Confidence in assessment skills, % “extremely”						
Determine whether a child is overweight/obese	53.2	48.8	50.0	58.3	53.5	48.0
Identify eating behaviors that increase children's risk for obesity	49.5	56.7	52.6	75.0	49.2	55.3
Identify screen time behaviors that increase children's risk for obesity	36.0	34.4	45.0	58.3	35.0	32.5
Identify physical activity behaviors that increase children's risk for obesity	38.0	39.8	47.4	50.0	36.7	38.9
Identify sleep behaviors that increase children's risk for obesity	18.4	19.6	20.0	41.7	18.2	17.9
Overall confidence score, mean (SD)	12.9 (3.3)	13.1 (3.3)	13.5 (3.3)	14.6 (3.5)	12.9 (3.3)	12.9 (3.3)
Report of practice frequency in counseling, % “always”						
Limit sugar-sweetened drinks	80.5	81.7	75.0	66.7	81.1	82.9
Replace non-nutritious foods with fruits and vegetables	77.5	81.7	70.0	75.0	78.3	82.2
Limit children's TV/video/screen time	33.2	35.0	36.8	25.0	32.8	35.8
Physical activity guidelines	33.8	32.3	30.0	33.3	34.2	32.2
Child sleep duration	9.4	13.4	10.0	16.7	9.3	13.2
Contact primary care provider of obese child	6.4	11.0	0.0	16.7	7.1	10.5

**Fig. 1.** WIC provider confidence scores by MA-CORD site at baseline (2012) and follow-up (2015).

Note. Adjusted for frequency of counseling factors, provider years in practice, and highest level of provider education.

Analyses were performed using SAS v9.3 (Cary, NC).

3. Results

Table 1 presents characteristics of the sample of WIC providers. Our sample consisted of 370 WIC providers across the entire state of Massachusetts, who were almost exclusively females (97.7%) and nutritionists (96.0%); the majority (83%) were college-educated. Respondents from usual care sites were more likely to have college degrees compared to respondents from MA-CORD sites (84.6% vs. 65.6%, $p < 0.01$); we observed no other significant differences.

Table 2 shows changes in provider confidence from the pre-intervention and post-intervention periods overall, and for MA-CORD sites versus usual care sites. At baseline (**Table 2**), providers overall were least confident in their ability to identify obesogenic sleep (18.4% extremely) and screen time behaviors (36.0% extremely). The average score on the provider confidence scale at baseline was 12.9 (SD = 3.3). Providers reported a wide range of practices. Of the 205 WIC completed baseline surveys, 20 (9.8%) providers were located within MA-CORD sites. MA-CORD sites reported slightly higher baseline confidence scores than usual care sites, although the difference was not statistically significant (13.5 versus 12.9; $p = 0.43$).

Of the 165 post-intervention survey respondents, 12 (7.3%) were from MA-CORD sites. The proportion of MA-CORD site providers who reported extreme confidence in individual assessment skills increased more over the study period than the usual care sites (**Fig. 1**). Confidence scores among providers located in MA-CORD sites increased over the study period compared to the usual care sites ($\beta = 1.01$, standard error = 0.13). These findings persisted in the fully adjusted models ($\beta = 1.13$, standard error = 0.12; **Fig. 1**). We observed no significant changes in practice measures.

4. Discussion

This study of a WIC intervention integrated into a multi-sector trial focused on reducing obesity among underserved children found that WIC providers in MA-CORD sites reported a significant increase in their confidence to assess children's obesity risk. We observed favorable changes in each component of our confidence assessment scale, including increases in the proportion of providers who were extremely confident in their abilities to determine a child's obesity status and to identify obesogenic eating, screen time, physical activity, and sleep behaviors. Demographic characteristics of WIC providers from MA-CORD sites were similar to those from usual care sites, where we were unable to detect these changes.

We also observed improvements across several – but not all – of the practice frequency measures. While the proportion of providers in MA-

CORD sites who reported always contacting primary care providers of children with obesity and counseling families on consuming fruits and vegetables, physical activity guidelines, and sleep duration improved, we observed unexpected decreases in the proportion who reported always counseling on limiting sugar-sweetened drinks and screen time. We cannot determine the reason for these findings, although it is possible that the small sample size for intervention sites, which did include the majority of WIC providers in MA-CORD sites, may have reduced our ability to detect significant changes. We administered serial, cross-sectional surveys to WIC providers and, given the study design, can only determine differences between the two samples, not individual changes in confidence or frequency of practices. Thus, we cannot account for substitution of one behavioral counseling topic, such as screen time, with another, such as sleep.

In previous analyses of MA-CORD, we found significant intervention effects related to the prevalence of child obesity-related health behaviors and decreases in BMI z-scores (Franckle et al., 2017; Taveras et al., 2017; Woo Baidal et al., 2017). While the design of MC-CORD meant we were unable to determine specific causes of these changes, it is possible that MA-CORD specific staff training and frequent contacts with project staff in other sectors may have contributed to these effects through increases in WIC provider confidence. In other research, higher confidence is linked to a greater likelihood of behavioral change among parents (Taveras et al., 2009). Also, similar to our current study, pediatric providers in the Texas Childhood Obesity Research Demonstration (TX CORD) project reported increases in self-efficacy but did not report changes in frequency of counseling on specific topics (Barlow et al., 2018). In that study, providers did report increased frequency of patient-centered counseling approaches over time (Barlow et al., 2018), a facet of counseling which we were unable to examine in our current study. While the observed changes in provider confidence in our study were relatively modest and we were unable to demonstrate differences in change in provider obesity-related practice frequency, overall, our results lend support to recommendations to include WIC providers in multi-sector interventions to increase provider confidence in best practices for childhood obesity prevention. Future research should use a randomized or blinded design to test the impact of provider confidence in helping engage families to making behavior changes to prevent childhood obesity.

4.1. Implications for research and practice

The MA-CORD WIC intervention positively influenced WIC provider confidence in identifying childhood obesity and risk factors. Integrating WIC into multi-sector efforts has the potential to enhance provider confidence in childhood obesity assessment, which may increase the reach of efforts to prevent childhood obesity.

Conflict of interest

The authors have no conflicts of interest to disclose.

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